

WHAT IS CLAIMED IS:

1. A suture material comprising an isolated, modified nucleic acid.

2. The suture material of Claim 1, wherein
5 the suture material comprises at least 50% modified nucleic acid by weight.

3. The suture material of Claim 1, wherein the suture material comprises at least 50% modified nucleic acid by volume.

10 4. The suture material of Claim 1, wherein the modified nucleic acid is modified in at least one manner selected from the group consisting of: capping, crosslinking, methylation, ethylation and attachment of a protein or small molecule.

15 5. The suture material of Claim 1, wherein the modified nucleic acid comprises at least 95% DNA per total nucleic acid.

6. The suture material of Claim 1, further comprising a biodegradable copolymer.

20 7. The suture material of Claim 6, wherein the biodegradable copolymer is selected from the group consisting of: polylactic acid, polyglycol alginate, polyglycolic acid, poly amino acids, polysaccharides, cellulose acetate, hyaluronic acid and collagen.

8. A method of making a suture material comprising:

- isolating a nucleic acid;
- modifying the nucleic acid; and
- 5 forming a nucleic acid filament.

9. The method of Claim 8, wherein the nucleic acid comprises at least 95% DNA per total nucleic acid.

10. The method of Claim 8, wherein the modifying comprises at least one technique selected from the group consisting of: capping, crosslinking, methylation, ethylation, and attachment of a protein or small molecule.

11. The method of Claim 8, wherein forming the filament further comprises:

15 extruding the purified nucleic acid through a spinneret; and

drying the extruded nucleic acid.

12. The method of Claim 8, further comprising adding a biodegradable copolymer to the modified nucleic acid.

20

13. The method of Claim 12, wherein the biodegradable copolymer is selected from the group consisting of: polylactic acid, polyglycol alginate, polyglycolic acid, poly amino acids, polysaccharides, cellulose acetate, hyaluronic acid and collagen.

25

14. A biomaterial matrix comprising an isolated, modified nucleic acid.

15. The biomaterial matrix of Claim 14, wherein the matrix comprises at least 50% nucleic acid by weight.

16. The biomaterial matrix of Claim 14, wherein the matrix comprises at least 50% nucleic acid by volume.

17. The matrix of Claim 14, wherein the nucleic acid comprises at least 95% DNA per total nucleic acid.

18. The matrix of Claim 14, wherein the modified nucleic acid is modified in at least one manner selected from the group consisting of: capping, crosslinking, methylation, ethylation and attachment of a protein or small molecule.

19. The matrix of Claim 14, further comprising a biodegradable copolymer.

20. The matrix of Claim 19, wherein the biodegradable copolymer is selected from the group consisting of: polylactic acid, polyglycol alginate, polyglycolic acid, poly amino acids, polysaccharides, cellulose acetate, hyaluronic acid and collagen.

21. The matrix of Claim 14, wherein the matrix comprises a hydrogel.

22. The matrix of Claim 14, wherein the matrix comprises a tissue scaffold.

23. The matrix of Claim 14, wherein the nucleic acid encodes a protein.

24. The matrix of Claim 23, wherein the protein is a wound healing factor.

25. A method of making a biomaterial matrix comprising:

- isolating a nucleic acid;
- modifying the nucleic acid; and
- 5 forming a biomaterial matrix.

26. The method of Claim 25, wherein the nucleic acid comprises at least 95% DNA per total nucleic acid.

27. The method of Claim 25, wherein the
10 modifying comprises at least one technique selected from the group consisting of: capping, crosslinking, methylation, ethylation, and attachment of a protein or small molecule.

28. The method of Claim 25, wherein forming
15 the biomaterial matrix further comprises:
freezing an aqueous solution of the nucleic acid;
and
lyophilizing the frozen aqueous solution.

29. The method of Claim 25, wherein forming
20 the biomaterial matrix further comprises:
preparing a solution of the nucleic acid; and
foaming the solution with supercritical carbon dioxide.

30. The method of Claim 25, wherein forming
25 the biomaterial matrix further comprises forming a hydrogel of the modified nucleic acid.

31. The method of Claim 25, further comprising adding a biodegradable copolymer to the modified nucleic acid.

32. The method of Claim 31, wherein the
5 biodegradable copolymer is selected from the group consisting of: polylactic acid, polyglycol alginate, polyglycolic acid, poly amino acids, polysaccharides, cellulose acetate, hyaluronic acid and collagen.

33. The method of Claim 25, wherein the
10 nucleic acid encodes a protein.

34. The method of Claim 33, wherein the nucleic acid encodes a wound healing factor.

35. A method for making a nucleic acid biomaterial comprising:

- isolating a nucleic acid; and
- modifying the nucleic acid;
- 5 forming a biodegradable polymer from the nucleic acid.

36. The method of Claim 35, wherein the nucleic acid biomaterial comprises at least 50% nucleic acid by weight.

10 37. The method of Claim 35, wherein the nucleic acid biomaterial comprises at least 50% nucleic acid by volume.

38. The method of Claim 35, wherein the nucleic acid comprises at least 95% DNA.

15 39. The method of Claim 35, wherein the biodegradable polymer is a drug carrier or wound dressing.

40. The method of Claim 35, wherein the modifying comprises at least one technique selected from
20 the group consisting of: capping, crosslinking, methylation, ethylation, and attachment of a protein or small molecule.

41. The method of Claim 35, further comprising
25 adding a biodegradable copolymer to the modified nucleic acid.

42. The method of Claim 41, wherein the biodegradable copolymer is selected from the group consisting of: polylactic acid, polyglycol alginate, polyglycolic acid, poly amino acids, polysaccharides,
5 cellulose acetate, hyaluronic acid and collagen.

43. The method of Claim 35, wherein the nucleic acid encodes a protein.

44. The method of Claim 43, wherein the nucleic acid encodes a wound healing factor.

45. A nucleic acid biomaterial comprising an isolated, modified nucleic acid.

46. The biomaterial of Claim 45, comprising at least 50% nucleic acid by weight.

5 47. The biomaterial of Claim 45, comprising at least 50% nucleic acid by volume.

48. The biomaterial of Claim 45, wherein the modified nucleic acid is modified in at least one manner selected from the group consisting of: capping,
10 crosslinking, methylation, ethylation and attachment of a protein or small molecule.

49. The biomaterial of Claim 45, wherein the modified nucleic acid comprises at least 95% DNA per total nucleic acid.

15 50. The biomaterial of Claim 45, further comprising a biodegradable copolymer.

51. The biomaterial of Claim 50, wherein the biodegradable copolymer is selected from the group consisting of: polylactic acid, polyglycol alginate,
20 polyglycolic acid, poly amino acids, polysaccharides, cellulose acetate, hyaluronic acid and collagen.